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Highly Ionized Spectra of Nitrogen and Oxygen.

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During this period work has been done to find suitable wavelength standards. It is important that these lines come from the same volume of the discharge as the unknown lines. This has been achieved by introducing small amounts of various gases, usually noble gases, in the discharge tube. The theta pinch discharge gives mainly the spark lines of the gases. In some regions accurately known arc lines are needed as standards. These are too week in the pinch discharge, but can readily be excited with a radio frequency oscillator, coupled capacitively to the tube. The pinch discharge and the r.f. discharge have been run alternatingly.

In the region 6500-8500 Å we have now a close system of AI and NeI standards, recommended by the International Astronomical Union. In the region 2890-5200 Å a set of AII lines, accurately measured by Minnhagen (private communication, to be printed), has been used. Below 2000 Å a number of lines given by Edlén (Reports on Progress in Physics, Vol, XXVI, 181, 1963) have been used and in the region 1600 - 3000 Å the wavelengths of HgI, HgII, NeI and NeII given by Wilkinson and Andrew (J. Opt. Soc. Am. 53, 713, 1963). The vacuum region is difficult because of the shortage of standard lines, and many problems remain to be solved.

For NV a number of new lines have given new term levels. Other new lines makes it possible to get a more accurate connection of already known term levels. It will now be possible to recalculate the whole term system of NV on the basis of new measurements above 200 Å. Great care has been taken to get good plates for measuring each individual line. The work on NV is in good progress, and a complete wavelength list will probably be ready for the next status report.

In the vacuum region lines from about 200 Å will successively appear in higher orders at longer wavelengths. This will make the interpretation more difficult. In the region above 1400 Å a fluorite window is used to take away higher order lines. A method to absorb short wavelengths by using some microns of argon or helium in the spectrograph has proved very useful. In this way it is possible to get rid of disturbing lines of high orders. Helium is transparent down to 504 Å and argon down to 787 Å except for resonance-line absorption. A drawback is that the noble gas will leak into

the discharge tube through the spectrograph slit, and noble gas lines will appear on the spectrograms.

The discharge circuit contains a low inductance, low pressure spark gap, which has a limited life time. We are trying to modify it to increase its life time without increasing its inductance.

The plates are now measured in an Abbe type comparator by looking at the plate directly through a microscope. We have started to plan for the building of a photoelectric device for measuring the plates. We expect that such a device will make the measuring procedure quicker and the resulting wavelengths more accurate.